

SNOWFALL.

There was considerable snowfall over the northern and western portions of the district, the amounts ranging from a trace to 54 inches, and a trace of snow was reported as far south as Baton Rouge, La. However, the snow over the regions east of Colorado did not remain long on the ground. In the Colorado area weather conditions in the mountains have been favorable for the water supply. During the month the precipitation was in the form of snow, and, although it was unevenly distributed, the amount, as a whole, was greater than usual. There was an excess in Lake, Huerfano, and Las Animas Counties, and in the northern part of Chaffee County. The average depth on the ground at the close of the month, at a mean elevation of 9,600 feet, was 9.4 inches. In the New Mexico area the snowfall was much below the normal, and conditions thus far have not been favorable for the storage of snow in the gulches.

RIVERS.

The Arkansas River was low throughout the month. In Arkansas the stages were so low that navigation was suspended.

In Oklahoma there were no floods and river stages changed but little.

Only slight changes occurred in the Red River and stages were very low.

The White River was considerably lower than usual, and navigation was practically at a standstill in the upper reaches.

Below St. Louis the Mississippi fell slowly during the first and second decades and rose slightly during the third decade.

NOTES.

Arkansas (H. F. Alciatore, section director).—This was the coldest November experienced in Arkansas in 17 years. The most noteworthy feature of the weather was the occurrence of the cold wave.

Oklahoma (J. Pemberton Slaughter, section director).—Destructive wind and sand storms occurred in some of the western counties. The subsoil is deficient in moisture, especially in the central and western counties; however, the top soil is generally moist and wheat is in fair condition.

FREEZES OF NOVEMBER 13 AND 29-30, 1911, IN THE SUGAR, ORANGE, AND TRUCKING REGION.

By I. M. CLINE, District Forecaster.

Two unusually severe freezes, for the season of the year, occurred in the sugar and trucking regions of Louisiana and Texas during November, 1911. The first freeze occurred on the 13th, and gave temperatures of 26° to 30° over the sugar region, being the coldest weather on record experienced so early in the season. The cane crop was very large and it had matured slowly. Many planters had not put down seed cane and consequently, the approach of such a freeze foreboded much damage to the sugar interests. Advices were received from the central office at 2 p. m., ninetieth meridian time, on November 11 extending cold wave warnings to Little Rock, Shreveport, and Palestine, and giving a special report from Dodge City, Kans. The report from Dodge City in connection with the rapid changes which were taking place at New Orleans indicated an exceedingly rapid movement southward of the cold wave, and on

account of the condition of the cane crop a message was telegraphed to the central office recommending that cold-wave warnings be extended to Taylor and San Antonio, Tex., and freezing warnings be issued for the sugar regions of Louisiana and Texas. Authority to issue such warnings was received at 4 p. m., November 11, and the following messages were distributed:

Saturday, November 11.—"East Texas: Cold wave in the interior of south portion; freezing is indicated for the sugar region; temperature will fall to 28° by Sunday night." "Southern Louisiana: Freezing is indicated for sugar region; temperature may fall to 28° by Monday."

Sunday, November 12.—"Texas and Louisiana: Temperature will be 24° to 28° in the sugar and trucking region Monday."

Notwithstanding that the day following the issuance of the warning was Sunday, planters put forth extraordinary efforts and much seed cane was saved, and many planters windrowed their cane as a precaution against a cane-splitting freeze. The temperature fell as low as 26° to 30° in the sugar, orange, and trucking region, but the cold was of short duration and the cane was not split. Seed cane of great value for the coming crop was saved, which without the warning would have been lost, and truck farmers protected and saved their crops.

The freeze of November 29 and 30, 1911, gave temperatures of 19° to 26° throughout the sugar, orange, and trucking region, the cold weather continuing for several days. At New Orleans, the lowest temperature during the freeze was 31°, only 2° higher than the previous lowest temperature of record in November, 29° on November 19, 1903. In the country surrounding New Orleans, however, the radiation was intense and the minimum temperatures were 8° to 14° lower than at New Orleans, and 2° to 4° lower than any temperature previously recorded in the sugar, orange, and trucking regions so early in the season. Timely warnings were issued for these freezes as follows:

Monday, November 27.—"Louisiana: To-night, rain, colder; Tuesday, fair preceded by rain on the coast; cold wave; temperature will be freezing in north and central portions and 32° to 36° in south portion."

"East Texas: To-night, rain or snow in north portion, rain in south portion; much colder; cold wave; temperature will be 24° to 30° in north portion and 32° to 36° in south portion."

Tuesday, November 28.—"Louisiana: To-night, fair, colder; freezing to coast, with temperature 24° to 28° in sugar and trucking regions." "East Texas: To-night, fair; somewhat colder, except in extreme northwest portion; freezing almost to coast, with temperature 26° to 30° in sugar and trucking regions."

Wednesday, November 30.—"Louisiana and east Texas: To-night, fair; probably freezing to coast; temperature will be 24° to 28° in sugar and trucking regions."

These warnings were given the widest possible distribution. In addition to the regular distribution at Government expense, several sugar planters and orange growers have warnings for temperatures below 30° telegraphed or telephoned to them at their expense in order to get the information at the earliest possible moment. The warnings issued on November 27, 28, and 29 enabled sugar, orange, and truck growers, who had made preparation to act on advices from this bureau, to protect and save their crops to the value of several millions of dollars which otherwise would have been lost. Sugar planters protected their cane by windrowing. Orange growers smudged their orchards and not only saved the trees from damage but saved the ripe fruit on the trees. Truck growers covered, smudged, and flooded their crops.

In order to enable the writer to study the freeze and effects on crops in connection with the forecast work, the recipients of the warnings were asked for reports relative to the effects of the freeze in their localities, and

the following extracts from these reports, showing the lowest temperatures and the action taken to protect crops, will be of service in pointing out to those who did not protect their crops the value which may be derived from the use of the warnings of the Weather Bureau, and also the methods of protection used:

Adeline, La.—F. W. Giles, for the Adeline Sugar Factory Co. (Ltd.): The lowest temperature was 23°. Warnings were received three days in advance of the freeze and were distributed by telephone and messenger. Cane of considerable value was windrowed and saved.

Avoca, La.—Oakley Planting Co. (Ltd.): The lowest temperature was 22°. Warnings were distributed by telephone and cane was windrowed.

Belle Alliance, La.—S. Prejean: The lowest temperature was 25°. Warnings were received and distributed and planters windrowed cane.

Bertrandville, La.—H. Meyer: The lowest temperature was 26°. Warnings were received and planters windrowed all the cane they could and truck growers covered their seed beds. The value of the crops saved runs into the thousands of dollars.

Bayou Goula, La.—J. M. Richards: The lowest temperature was 27°. The warnings were distributed by telephone and cane was windrowed. The crop saved is worth thousands of dollars.

Booth, Tex.—F. I. Booth: The temperature fell to 20°. Warnings were received one day in advance. Planters were notified and commenced windrowing cane.

Bunkie, La.—G. F. Ford: The lowest temperature was 24°. Warnings were received on November 27. Cane was windrowed and a good saving resulted.

Cades, La.—C. E. Smedes: The lowest temperature was 21°. The warning was received on the morning of November 27. Planters were notified and they windrowed their cane.

Carlisle, La.—R. G. Carlisle: The lowest temperature was 25°. The warning was received and distributed by messenger. It was in ample time to enable the saving of beds of young plants, lettuce, cabbage, etc., which were covered with moss. Planters commenced windrowing cane.

Convent, La.—Jules J. Jacob: The lowest temperature was 22°. Warnings were received and promptly distributed. Windrowing cane was resorted to by one and all, and in my estimation the value of the crop saved as a result of the warnings is not less than \$60,000.

Dalcour, La.—John Meyer & Sons: The lowest temperature was 26°. Warnings were distributed personally and sugar cane was windrowed. The value of that saved amounts to thousands of dollars.

Diamond, La.—G. V. Groleaux: The lowest temperature was 29°. The warning was received one day in advance and was distributed verbally, by telephone, and by messenger. Crops of vegetables were covered; orange trees were smudged with wood fires and by other methods; and cane was windrowed. The value of the crops saved was \$12,000 to \$15,000.

Dorseyville, La.—L. M. Soniat: The lowest temperature was 23°. The warnings were received two days in advance and were distributed by telephone. Planters windrowed cane and covered some that was cut. Possibly 10 per cent of the total crop was protected and saved as a result of the warnings.

Falfurrias, Tex.—W. A. Gardner: The lowest temperature was 20°. Warnings were distributed by telephone and messenger. Smudge pots for protection of crops had been ordered for delivery about December 1, and many were caught unprepared. Those who had smudge pots protected and saved orange trees valued at \$10,000. Unprotected crops suffered damage to the extent of \$100,000.

Franklin, La.—Columbia Sugar Co.: The lowest temperature was 23°. We commenced windrowing cane immediately on receipt of warnings. The value of the cane saved amounts to \$1,000.

La Place, La.—Woodland plantation, C. L. Bougere: The lowest temperature was 23°. Warnings were received one and one-half days in advance of the freeze and were distributed by messenger. Planters windrowed cane, and 30 per cent of the crop was actually saved by the warnings.

Lakeland, La.—Alma plantation, J. B. Churchill, president and general manager: The lowest temperature was 24°. The warning was received 48 hours in advance and was distributed by telegraph and telephone. Cane crops of great value were windrowed and saved.

Lawrence, La.—Hon. H. C. Warmoth: The lowest temperature was 26°. Warnings were received two days in advance of the cold and were distributed by telephone. Cane was windrowed as rapidly as possible. The value of that saved was large.

Lockport, La.—S. Bergeron: The lowest temperature was 23°. Warnings were received and distributed by telephone. Cane was windrowed and small plants were covered. A great benefit was derived from the warning.

Mercedes, Tex.—D. H. Kennett, secretary, Commercial Club: The lowest temperature was 21°. Warnings were distributed by telephone and automobile personally. All farmers used water to protect from the freeze.

Alexandria, La.—Richland plantation, A. B. Pendleton: The lowest temperature was 18°. Warnings were distributed by telephone. Superhuman efforts were put forth to protect crops, and the value of that saved is large.

Morgan City, La.—W. V. Bateman: The lowest temperature was 28°. Warnings were distributed by telephone and planters windrowed their cane.

New Iberia, La.—H. Gallois: The lowest temperature was 28°. Warnings were distributed by telephone and planters commenced windrowing cane.

Plaquemine, La.—A. H. Gay, jr.: The lowest temperature was 22°. Warnings were received 36 hours in advance and were distributed by telephone and telegraph. Planters windrowed standing cane, and the value of that saved was large.

Raceland, La.—The Leon Godchaux Co. (Ltd.): The lowest temperature was 24°. Warnings were received and distributed by telephone and otherwise. Windrowing of cane was immediately resorted to, and we believe the warnings were the means of saving a great deal of the crop.

San Benito, Tex.—B. H. Frazier: The lowest temperature was 26°. Warnings were received approximately 36 hours in advance and were distributed by notices posted in prominent places, by telephone, and by ditch riders covering the canal system. Some used smudge pots, others built fires around their land, and a great number irrigated. I think that the cabbage crop was protected to the value of at least \$25,000 to \$30,000.

Sugarland, Tex.—W. J. Eldridge, president, Cunningham Sugar Co.: The lowest temperature was about 21°. Warnings were received about 24 hours in advance of the freeze and were telephoned to every planter we could reach. Farmers did not protect their crops as much as possible, but some windrowed their cane.

St. Francisville, La.—F. W. Barker: The lowest temperature was 30° on the 29th, and the first warning was received on the morning of the 27th. Crops were protected and saved to the value of about \$10,000.

Thibodaux, La.—H. Shrodt: The lowest temperature was 26°. Warnings were distributed by telephone. Some planters began windrowing cane; others did nothing until too late.

Victoria, Tex.—L. M. Stearns: The lowest temperature was 18°. Warnings were distributed by telephone, and some sugar planters succeeded in windrowing a portion of their cane. Many of our largest planters have no telephone connection, and unless they see the posted notices have no way of learning the forecasts.

Mathews, La.—C. S. Mathews: The lowest temperature was 24°. Warnings were distributed to all of our cane growers, and they windrowed their crops. The value of the crop protected and saved amounts to millions of dollars.

Naomi, La.—Riverside Orange Grove, R. S. Moore, owner: The lowest temperature was 20°, warnings for which were received 24 hours in advance. Cane growers windrowed their cane. I smudged my orange groves with fuel-oil burners and saved \$4,000 of oranges on the trees.

Sunshine, La.—Granada Plantation, W. W. and J. A. Ventress: The warnings issued on the 28th of November were of very great service, as they enabled us to windrow our cane, thereby saving all the crop. The cane in the windrow is as good as the day it was put down.

The following editorial, which appeared in the Times-Democrat on December 3, 1911, will be of interest in this connection:

WEATHER PREDICTIONS AND CANE CROP.

It is impossible as yet to determine definitely and accurately the damage and loss to the Louisiana cane crop caused by the two recent freezes. It is unquestionably heavy, but how heavy we will not know until a careful examination has shown the condition of the cane. It is believed that it will be possible to determine this point in the next few days, and that we will then know within a few thousand dollars how much Louisiana has lost by the two unexpected and early freezes of last month.

Louisiana—and New Orleans in particular—have counted with great confidence on its sugar crop. The acreage was larger than usual; the cane, although a little backward, was in good condition and promised an exceptionally large tonnage to the acre; and, finally, sugar is commanding a better price than for years past. A profit on the crop of between \$7,000,000 and \$10,000,000 over last year was looked for, and the circulation of that money promised activity in every line of business.

Suddenly and unexpectedly there descended on the sugar belt the freeze of November 13. It was one of the earliest freezes ever known in this section, and caught the planters unprepared, when they had only just begun their grinding. Fortunately, the freeze continued only a few hours, so that the loss was not as heavy as it would otherwise have been. Two weeks afterwards, on November 27, came another freeze, more far-reaching, more severe, and far more damaging. It is the

uncertainty as to the amount of this damage that renders it impossible to figure out the exact loss.

If we look back to the old records, before the Government established the Signal Service or Weather Bureau, we will find that the damage from premature freezes of this kind brought overwhelming ruin to the cane crop, and that in many years the crop was injured three-fourths and more. The planters had nothing to guide them as to the weather, no notice of the coming of a freeze until it was on them. To-day, because we know more of the weather, the loss is not likely to be over 15 per cent.

It is difficult to appreciate how much these weather forecasts mean to the cane growers, for perhaps no crop is in greater danger from sudden temperature changes than sugar cane. Both of the recent freezes were sudden. The wind which carried the cold wave of November 13 to the sugar belt was blowing 40 to 50 miles an hour. It was impossible, therefore, to predict the freeze more than 40 hours in advance; but these 40 hours given the sugar planters to prepare were invaluable and saved Louisiana from millions of dollars of loss. The second freeze was predicted, or rather announced, two days in advance of its arrival, and gave the planters ample time to get ready for their enemy. These warnings permitted the saving of the greater part of the crop, and were valuable not only for the present but for future years, for they enabled the planters to save the seed cane. But for them we would have had to reduce our cane acreage next year.

The country correspondents of the Louisiana Planter furnish some valuable information on this point. Thus from Iberville we learn that a majority of the planters heeded the warnings at once, and began to windrow the moment the Weather Bureau informed them a cold wave was on its way here, and they thus saved their crop.

In Assumption a number of planters did not believe the warning, and will lose heavily in consequence of their failure to windrow. But the strongest evidence comes from Lafayette, where the Planter's correspondent remarks:

"Fortunately the United States Weather Bureau gave timely warning of the coming freeze, and those planters who had standing cane were able to put it in windrows before the cold blast struck. A few, however, were caught, not fully appreciating the warning, and trusting to luck that after all Uncle Sam's prediction as to destructive cold approaching might not come true. It is, therefore, quite certain that there will be some further loss, not only of standing cane, but of much exposed in heap rows."

Probably next time they will give better heeding to these warnings. The weather reports have vindicated themselves and proved their value; and with this protection and notice properly utilized by the planters the cane crop will be better protected against sudden changes in weather conditions and the crop made more certain. The Weather Bureau in its predictions, especially as far as freezes go, has made great progress in the last few years, and we may hope for still further improvement as the science of meteorology progresses.

ABNORMALITIES OF NOVEMBER WEATHER AT SPRINGFIELD, MO.

By JOHN S. HAZEN, Local Forecaster.

Abnormally high barometric pressure prevailed during the first of the month and on November 2 a reduced pressure reading of 30.83 inches was recorded, breaking the record for high barometric pressure during the past 25 years in the month of November.

A comparatively rapid decline followed, until the 5th of the month. This rapid fall of pressure resulted in an unusual elimination of diurnal temperature changes. The temperature at Springfield rose steadily from 2 a. m. of the 5th to 6 a. m. of the 6th. A comparison of the records of temperature from Bentonville, Ark., and Iola and Topeka, Kans., indicates similar conditions over a

considerable area, although the records from outside stations do not show as pronounced a change in temperature conditions as is shown by the records at Springfield. On November 11, a pressure, reduced to sea level, of 29.33 inches occurred, which breaks the record for low pressure during the month of November. This reading was followed by a rise in pressure of 1 inch in about 17 hours. On the 11th, cloudy weather prevailed during the early morning, but cleared for a short time before noon. By 2.30 p. m. the sky was again overcast by cirrus and alto stratus clouds, moving rapidly from the southwest, while a dense greenish black bank of clouds was rising along the western horizon, moving gradually to the northwest. By 3.30 p. m. dark and ominous appearing clouds extended along the northwestern horizon and at 3.45 p. m. this cloud overshadowed the city with the speed of an express train, and the darkness of the early evening. The darkness lasted but a few minutes, when the condition was relieved by lighter colored clouds from the north.

The winds ranged from 18 to 30 miles per hour from the south from midnight until 9.30 a. m., changing to southwest after that time and increasing in velocity to 40 miles per hour by 2 p. m. At 3.45 p. m. the winds shifted from southwest to northwest, with one minute from the west and immediately reached an extreme velocity of 74 miles per hour, with a maximum velocity for a 5-minute period of 54 miles per hour. At least a dozen houses and barns were blown down within the city, hundreds of trees were broken off or uprooted, and much damage done to both telephone and electric-light wires. A window in the Government building, 4 by 6 feet, was blown in and entirely across a room 20 feet wide. There was no evidence of a whirl, except as the wind shifted from the southwest to the northwest, and the greater number of trees and houses were blown due east or slightly to the northeast. The highest velocity of the wind as recorded on the tower of the Government building was from the northwest.

Temperature and pressure records indicate clearly the violence and rapidity of the changes. A temperature of 80° was recorded at 3.45 p. m., breaking the record for high temperature during any previous November in the last 25 years, and falling from 80° to 13° at midnight, which likewise breaks the record for low temperature this early in the month of November. Rain, hail, sleet, and snow fell within a period of less than two hours, and a moderate electric storm commenced after the temperature had fallen to below freezing and more than an hour after the wind had shifted.

The center of this disturbance probably passed somewhat to the north of this city, and there was an abnormally rapid rise in pressure from 29.3 inches at 3.45 p. m. of the 11th to 29.8 inches at 7 p. m.

The record for varieties of weather and violent fluctuations in meteorological elements during a 24-hour period has not heretofore been equaled at this station.